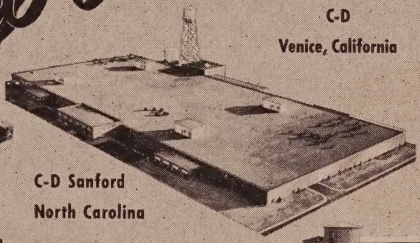
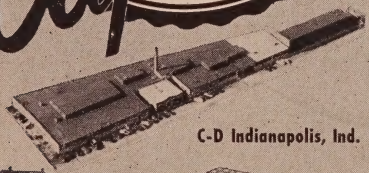
the CORNELL-DUBILIER Capacitor

Subsidiary
The Radiart Corp.
Cleveland, Ohio

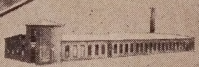
C-D
Venice, California



C-D Sanford
North Carolina

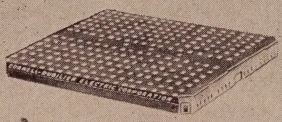


C-D Indianapolis, Ind.

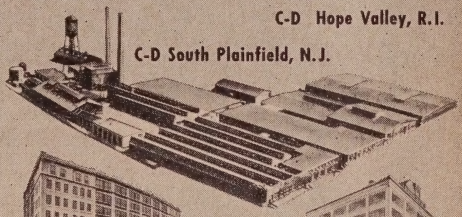


C-D Hope Valley, R.I.

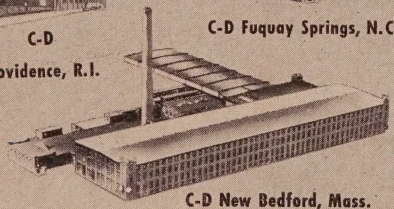
C-D
Providence, R.I.



C-D Fuquay Springs, N.C.



C-D South Plainfield, N.J.



C-D New Bedford, Mass.

C-D Worcester, Mass.

C-D Cambridge, Mass.

Vol. 24 SEPTEMBER - OCTOBER, 1959 No. 5

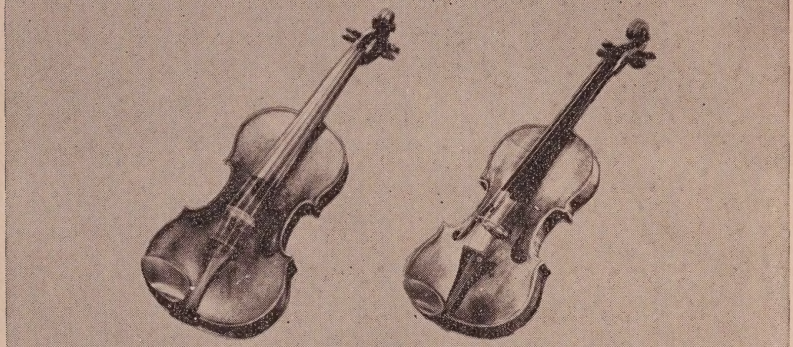
CORNELL-DUBILIER ELECTRIC CORP.
Hamilton Boulevard, South Plainfield, N. J.

POSTMASTER: If undeliverable for any reason, notify stating reason, on Form 3547 postage for which is guaranteed.

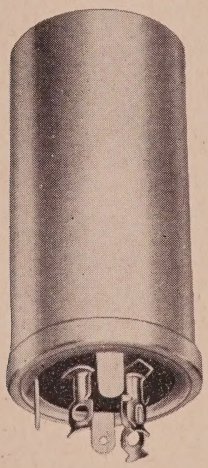
Sec. 34.66 P.L.&R.
U. S. POSTAGE
PAID
So. Plainfield, N. J.
Permit No. 1

MR.W.E.HILLIARD
PENN ALLEN RADIO SHOP
438 ALLEN ST.
ALLENTOWN,PA.

They May Look Alike...



But what a difference!



It's the same with capacitors. Others may look like C-D twist-prong electrolytics, but only C-D's have the built-in extras that are the result of 50 years of capacitor leadership. Next time you buy capacitors, insist on performance. Insist on C-D... *by name!*

TWIST-PRONG BASE ELECTROLYTICS

Furnished with bakelite and metal mounting washers, these small, round-can units are available in single, double, triple and quadruple sections and over 700 different capacity/voltage combinations.

insist on them by name

CORNELL-DUBILIER CAPACITORS

Copyright, 1959. Cornell-Dubilier Electric Corporation.

STABILIZING TRANSISTOR CIRCUITS

Semiconductors inherently are temperature-sensitive materials. Diodes, transistors, and other components made from these materials therefore operate differently at one temperature than at another. Such variations proved frustrating to early workers with transistor circuits, since this pronounced temperature dependence had not been encountered with vacuum tubes. Some transistors stop amplifying altogether when they are heated to a certain point. In addition to variations due to the temperature sensitivity of germanium or silicon, shifts of operating point can be caused by parameters of replacement transistors, which differ somewhat from those of original units.

Obviously, predictable and reliable performance of transistor circuits may be obtained only if the transistor operating point is stabilized against shifts. The development of methods of effectively compensating transistor circuits followed several lines of attack and has resulted in practical schemes which greatly improve circuit stability. This article presents a simple discussion of practical stabilization of the transistor circuit. A bibliography is given for more intensive readings.

Current vs. Temperature

Transistors and diodes are essentially current-operated devices, hence their current-temperature coefficients are of chief interest in stability studies. Their resistance-temperature coefficients are important but of secondary significance, since these have as their basis the underlying current variations. The transistor currents are i_b (base current), i_e (emitter current), and i_c (collector current). Especially important is the static leakage, or cutoff, current which flows in the collector circuit under zero-signal conditions. Each of these currents increases with temperature, since the semiconductor has a negative temperature coefficient of resistance. Internal, as well as ambient heating increases the transistor currents.

The cutoff current is lower in silicon than in comparable germanium transistors. Thus, at 25°C, this current might be as low as 0.005 microampere in a small-signal silicon transistor operated at a collector voltage of 20v, while it would be 6 μa or more in a germanium transistor of the same beta rating and operated at the same collector voltage. The cutoff current is higher in power transistors than in small-signal units; for example, being of the order of 10 ma in a power transistor designed for a maximum power dissipation of 10 watts and operated at a collector potential of 80v. Cutoff current doubles approximately for each 10°C rise in temperature.

Effect of Cutoff Current Shift

Figure 1 shows the simplest type of common-emitter amplifier circuit. This arrangement has no compensation whatever. From its configuration, with respect to Resistor R_b, this circuit is commonly referred to as the "series resistor-biased" type.

In this arrangement, the transistor receives its base-emitter bias current, i_b, from the collector battery, V_{cc}, through the series resistor, R_b. After a suitable value of i_b (i. e., the d-c operating point of the transistor) has been selected by reference to the family of v_c versus i_c i_b curves for the chosen transistor, the correct value of R_b may be determined by means of Ohm's Law: $R_b = V_{cc}/i_b$. The internal base-emitter resistance, r_{be}, does not enter into this calculation because this resistance is so small, with respect to R_b, that it can be neglected.

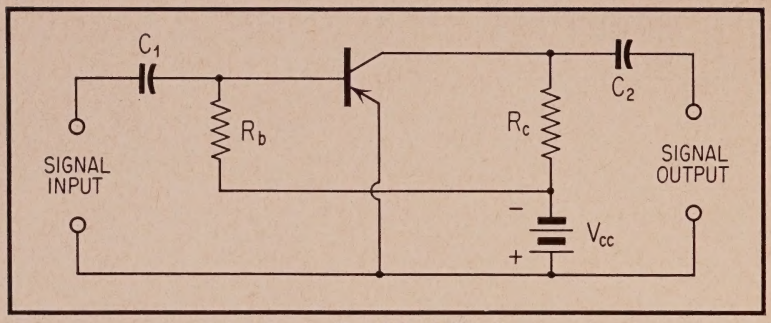


Fig. 1. Unstabilized Circuit.

The inadequacy of the series resistor bias method arises from the fact that the base-emitter current, and therefore the transistor operating point, is not determined solely by R_b; a large proportion of this current is due to current, i_c, flowing in the collector-emitter path. When i_c (which contains the i_{co} component) increases as the result of temperature rise, i_b therefore increases also. This causes a still further increase in i_c through action of the transistor base-collector current gain, beta — and a further increase in i_b. The net result of this action is to shift the operating point and also to cause the collector current to increase rapidly, producing further heating of the transistor and sometimes finally resulting in damage from collector current "runaway." The series resistor method of biasing therefore is not to be recommended in practical circuits.

Voltage Divider Stabilizing Circuit

It is evident that the circuit should be stabilized by rendering the base cur-

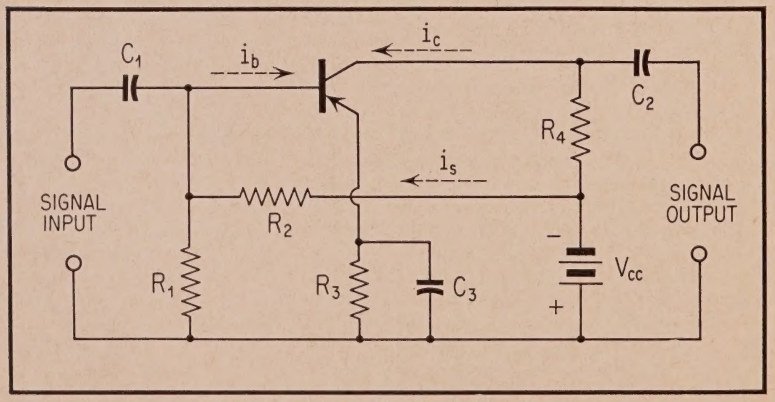


Fig. 2. Stabilized RC-Coupled Amplifier.

rent, and accordingly the operating point, less dependent upon variations in i_c and i_{co}. One such method developed by Richard F. Shea for stabilizing the base bias is illustrated by Figure 2.

In this circuit, the d-c base current is supplied by the tap on the voltage divider, R_1-R_2, operated from the collector battery V_{cc}. If the divider is properly proportioned, this voltage will not be subject to variations in transistor parameters, and the base current will not be significantly dependent or influenced by shifts in i_c and i_{co}. For this purpose, the total resistance of the R_1-R_2 combination is chosen such that the bleeder current, i_s, is much larger than the base current, i_b. The resulting stiffness of the voltage divider provides the required regulation. But since the base current available from the junction of R_1 and R_2 may be large enough to cause a higher collector current flow than the desired design value, a series resistor, R_3, will be required to reduce this current. Capacitor C_3 bypasses this resistor at signal frequencies but may be omitted if the degeneration introduced by R_3 is to be retained.

While the voltage divider must provide good regulation, the bleeder current must not be great enough to cause excessive drain on the battery. Another factor which must be taken into consideration is the position of the lower divider resistor, R_1, in parallel with the signal input. If this resistance is too low, the signal source will be heavily loaded, the net input impedance of the circuit will be lowered, and the power gain of the amplifier will suffer. Obviously, a compromise often must be reached in the selection of R_1 and R_2.

Practical Example

The following practical example illustrates the simple selection of resistance values for the circuit of Figure 2. Consider that a Type 2N77 transistor is to be operated at a d-c collector-to-emitter voltage (v_c) of —4v, a collector current of—0.7 ma, and that the supply potential (V_{cc}) is —6v. (The collector current and voltage are obtained from Typical Operating Conditions in the 2N77 characteristics table). Before stabilizing the circuit, the collector resistor, R_1, then would be equal to $(V_{cc}-v_c)/i_c = (6—4)/0.0007 = 2/0.0007 = 2857$ ohms. Now, it is noted from the characteristics sheet that $\beta = 55$. So the required base current will be $0.7/55 = 0.0127$ ma $= 12.7\mu$a. It is also noted from the tables that the emitter resistance (r_e) of this transistor is 23 ohms, and the base resistance (r_b) 1430 ohms. The total input resistance thus is $r_b + r_e = 1453$ ohms. This means that a base-emitter voltage (v_b) equal to $i_b(r_e + r_b)$ is required for the base current of 12.7 μa. In other words, $v_b = 1.27 \times 10^{-5}(1453) = 0.018$v.

Now, let us try a voltage divider ($R_1 - R_2$) through which the bleeder current will be approximately 10 times i_b, or 100μa. Since the divider will be operated from the 6-volt battery, its total resistance will be $6/10^{-4} = 60{,}000$ ohms. If the divider is proportioned to deliver 0.5v to the base of the transistor, the resistance ratio $(R_1 + R_2)/R_1$ must equal 12, in order to drop the 6v battery potential to 0.5v. Choosing $R_1 = 5$K, we find that R_2 must be 55K.

It is clear, however, that a base potential of 0.5v will force a current, i_b, of approximately 0.34 ma through the 1453-ohm base-emitter resistance and this, in turn, will raise the collector current to $\beta i_b = 0.34(55) = 18$ ma. To reduce this current to the 0.7-ma design value, we now insert

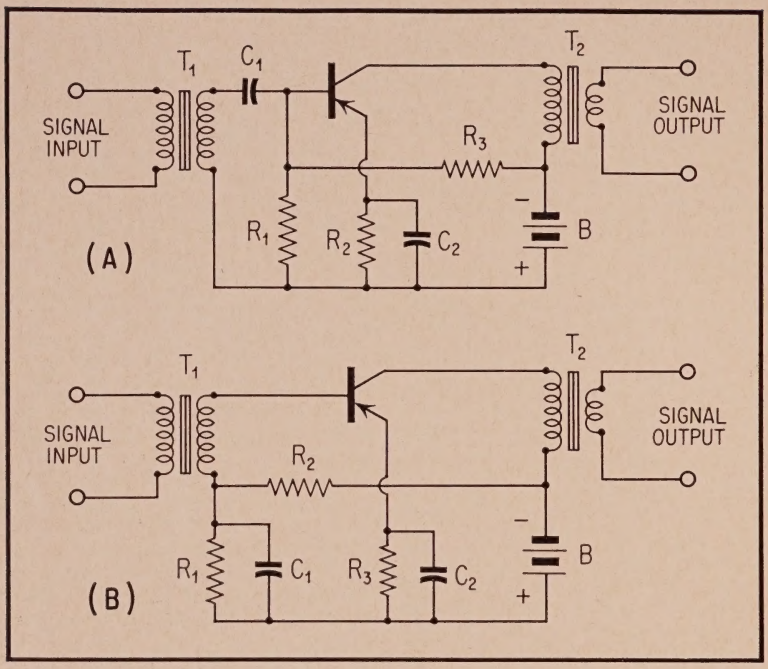


Fig. 3. Transformer-Coupled Circuits.

Resistor R_3 in the emitter circuit. The emitter voltage will be equal closely to the base voltage; that is, to 0.5v. So the required resistance of $R_3 = 0.5/i_e = 0.5/0.0007 = 714$ ohms.

It was determined in the beginning (in the calculation of R_4) that the maximum resistance in series with the collector, emitter, and battery would be 2857 ohms. This value therefore must be divided between R_3 and R_4: In order to maintain the desired d-c collector-emitter potential of –4v, R_4 may be decreased by 714 ohms to 2143 ohms.

Thus, the calculated values could be made up exactly with suitable resistors. However, the nearest commercial values may be employed, as shown below.

	Calculated	Nearest EIA Values
R_1	5K	4.7K
R_2	55K	47K
R_3	714 ohms	750 ohms
R_4	2143	2200

Additional Circuits

Figure 3 shows arrangements employed for the stabilization of transformer-coupled amplifier stages. In Figure 3(A), the base is connected directly to the tap on the voltage divider, $R_1 - R_3$. Blocking capacitor C_1 is required to prevent the secondary of the input transformer, T_1, from

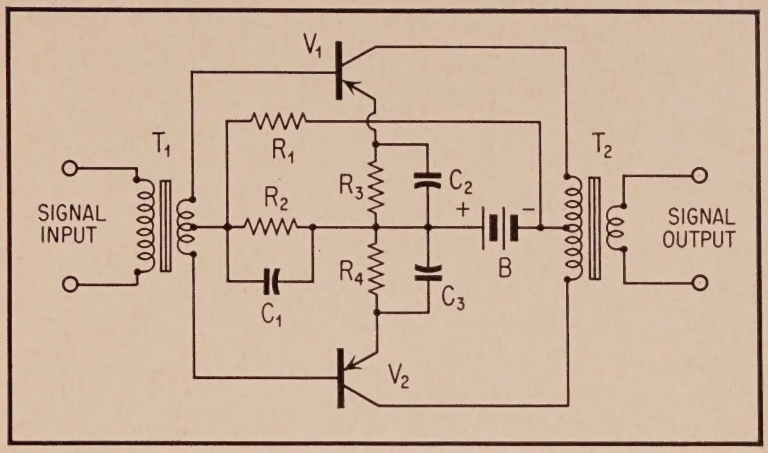


Fig. 4. Pushpull Arrangement.

short-circuiting the bottom resistor, R_1, of the divider. This arrangement is recommended when the d-c base current must be kept out of the input transformer.

In Figure 3(B), the d-c bias voltage developed at the tap of the voltage divider, R_1–R_2, is applied to the base of the transistor through the secondary of the input transformer, T_1. The bottom resistor, R_1, of the divider is bypassed by C_1 to prevent loss by input-signal voltage drop across this resistor.

In each of the transformer-coupled circuits, the emitter series resistor (R_2 in Figure 3A; R_3 in Figure 3B), is shown bypassed for maximum gain. This capacitor may be omitted if the degeneration provided by the emitter resistor is desired.

Figure 4 shows the stabilizing bias arrangement in a typical pushpull amplifier stage. Here, the d-c bias voltage for both bases is developed at the tap of the voltage divider, R_1-R_2, and is applied to the bases through the center-tapped secondary of the input transformer, T_1. The bottom resistor, R_2, of the divider is bypassed by C_1 to prevent loss due to input-signal voltage drop across this resistor. A separate series resistor (R_3, R_4) is provided for each emitter. For maximum gain, these resistors are bypassed by C_2 and C_3. However, these capacitors may be omitted if the current degeneration provided by the emitter resistors is desired.

Some designers recommend bias resistors having positive temperature coefficients to compensate for the negative temperature coefficient of transistor resistive parameters. Along this line, Figure 5 shows a positive-temperature-coefficient thermistor in use as the emitter series resistor. Semiconductor-type resistors having positive temperature coefficients also are available commercially. Whichever type of compensating resistor of this sort is employed, its positive coefficient must be exactly equal to the negative coefficient of the transistor resistance, in order to reduce to zero the current variation due to temperature. If the

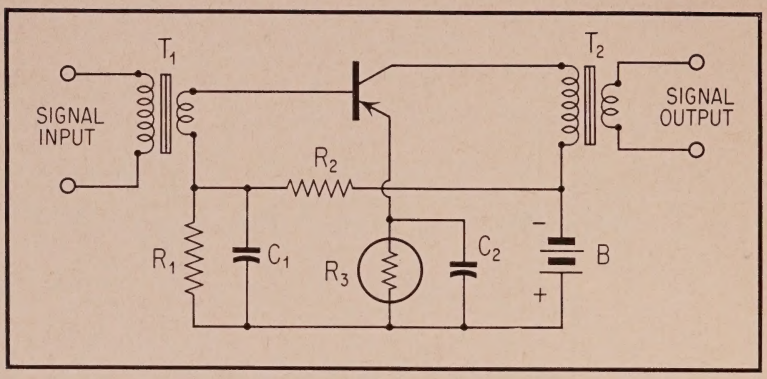


Fig. 5. Use of Thermistor.

positive resistor has a lower coefficient, undercompensation will result; and if it has a higher coefficient, overcompensation will result.

While, for purposes of illustration, simple amplifier circuits have been shown in this article, the voltage-divider method of transistor stabilization is not confined to amplifiers. Oscillator and converter circuits, for example, are stabilized in the same manner.

References

The subject of transistor stabilization has been treated in great detail in the literature. This article has been intended as an introduction to the practical application of circuit compensation, so topics such as stability factor, optimum loading, and battery economy have not been elaborated. The reader is referred to the following sources for more extensive treatment of the subject.

1. "Transistor Operation: Stabilization of Operating Points." Richard F. Shea. **Proceedings of the I. R. E.,** November 1952.
2. "Stabilizing Transistors." Sol Sherr and Theodore Kwap. **Tele-Tech and Electronic Industries,** March 1955.
3. "Designing Reliable Transistor Circuits." Norman B. Saunders. **Electronic Design,** April 1955.
4. "Predictable Design of Transistor Amplifiers." Richard B. Hurley. **Tele-Tech and Electronic Industries,** August 1955.
5. "Transistor Bias Stabilization." Paul Penfield, Jr. **Audio,** May 1956.
6. "Stabilizing Transistors." L. Fleming. **Radio and Television News,** August 1956.
7. "Transistors in Audio Circuits." Paul Penfield, Jr. **Audiocraft,** March 1957.
8. "Systematic Design of Transistor Bias Circuits." Ray P. Murray. **Electronic Industries and Tele-Tech,** November 1957.
9. TRANSISTORS, THEORY and PRACTICE (Book) 2nd Edition. Rufus P. Turner. pp. 69, 70.

This CORNELL - DUBILIER Advertising Service is FREE to "Capacitor" readers. If there is anything of general interest or appeal in the line of **electronic** equipment or service that you want to BUY — SELL — or SWAP . . . if you want a job or need help, these columns are at your service.

Please PRINT or TYPE your Ad clearly and limit it to 40 words including your name and address. Because of space limitations — only one Ad at a time — please.

Ads are published in the order received and as space permits.

CORNELL-DUBILIER ELECTRIC CORP. reserves the right to edit your Ad to conform to its policies and is the final judge of its suitability for publication. We do not assume any liability or responsibility for any transaction that results. Make your deal direct with the advertiser listed in the Ad.

If you have a "CHANGE OF ADDRESS" — give both your OLD and NEW and mark your request "For C-D Capacitor Mailing List."

IF YOU ARE RECEIVING DUPLICATE COPIES FOR WHICH YOU HAVE NO USE, PLEASE ADVISE YOUR LETTER CARRIER STATING — "DUPLICATE — NOT WANTED".

SELL OR TRADE — Mohawk Midgetape miniature tape recorder, with accessories for $95. or ham gear. P. C. Conley 14 Wesley Pk., Somerville 43, Mass.

FOR SALE — BTU-2 Blonder-Tongue never used and used Bogen. Both guaranteed. Both for $35. or TV tubes in trade. Roy's Sales Service, Bridge St., Luzerne, N. Y.

WANTED — AM-FM or FM only table model radios in workable condition. Also Bogen R620 FM-AM or FM 50 FM tuner. S. Miller, Bx 3013, Kingsport, Tenn.

FOR SALE — HRO-50 T-1 receiver like new in original carton, speaker included, all coils. First $250. takes it. Hal Fleischut, 1928 W. End Ave., Pottsville, Pa.

SWAP — Hardly used Eico 425 push pull scope. For good portable tape recorder. E. R. Whittaker, Escoheag, R. I.

WANTED — Old radios battery vintage also tubes, parts, etc.; RCA AR 88D and Collins SIJ. Will swap or pay cash. R. Ernstein, 13104 Strathern, N. Hollywood, Cal.

SWAP — Sensi-meter of Service Instrument Co., Chicago, Net $129. Want Land camera or comm. rcvr. Joseph Czapracki, 391 E. Ridge St., Nanticoke, Pa.

WANTED — Set of code Practice records. State price. Will sell all or part of radio tube stock, very reasonable. Chas. L. Rader, 952 Bay View Ave., Oakland 10, California.

FOR SALE — Ten 304 TH, $9.95 each; 2 10V@25A FIL. Xformers for 304 TL, 304 TH, $10. each. 600v 1.8 KVA Amertran plate xformer, $30. Lawrence F. Smith, Horse Pond Rd., R. I., S. Sudbury, Mass.

SELL or TRADE — Sutton 23A converter (UHF) 3 tubes, $10. or trade for VTVM, sweep generator, or? Edward Benn, 1360 NW 42 St., Miami 42, Fla.

TRADE — Stevens 620 16 ga. pump shotgun, 5-shot capacity, polychoke, recoil pad, excellent cond. for Eico 460 scope of like cond. Alan E. Heidel, 713 Simcock St., Council Grove, Kan.

FOR SALE — Camera tube in working cond. from studio camera. Type 5820 Image Orthicon. $40. in carton with factory instructions sheet. P. L. Koch, 3534 Connecticut St., St. Louis 18, Mo.

FOR SALE — 16" Artone (Macy's) T.V. beautiful mahog. cabinet table model, new picture tube, rectangular, $40.00. Thomas Dolan, 16 Foster Ave., Valley Stream, L. I., N. Y.

FOR SALE — Radio — TV Sales & Service at less than cost, over 10 yrs. in one good location, low rent, $1200 down, balance out of profits. D. E. Blanton, 409 S. Broadway, Poplar Bluff, Mo.

FOR SALE — Superior TV 40 CRT tube tester, $8.50; Weston 506 DC Voltmeter, scales 0-6, 0200 VDC $6.. Emico AC voltage meter scale 0-150, $1.40. E. Giroux, 735 Park Ave., Hoboken, N. J.

FOR SALE — Complete TV Service business. no kits. Testers, tubes, tech-files and Sams, small tools like new, manuals, $700. cash. You pick up. Will not break set. H. F. Buchanan, 727 So. 35 St., Louisville 11, Ky.

FOR SALE — Paper meter scales for most milliampere ranges and sizes, 25c each or will rescale and shunt meter for new scale, $1.50 each. E. E. Telford, 1237 So. Toledo, Tulsa 12, Okla.

FOR SALE — HT-20 Hallicrafters xmitter tunes all freqs from 1.7 through 31 mc. WRL VFO 755, D-104 mike spare 4D32 tube, all for $200. SX96 Hallicrafter rcvr and speaker, $175. Joe L. Lowdermilk, Box 444, Morganton, N. C.

FOR SALE — Electrical contractor and TV repairman's equipment at sacrifice. Best offer over $250. for each lot. Mrs. G. A. Wright, 107-10 32 Ave., E. Elmhurst 69, L. I., N. Y.

FOR SALE — Type 5B Weston 798 mutual conductance tube checker, very good cond., $65. Harold Miglin, Box 242, Sparta, N. J.

WANTED — **Urgent** — Complete dial and escutcheon for RCA radio model HF-2; also drum dials and band-spread type dials round vernier. F. La Fave, 35 Woodland Rd., Wakefield, Mass.

WANTED — Chassis for G. E. 14T009 portable TV less tubes. State condition price. Bill Messina, 43 Wentworth St., Boston 24, Mass.

WANTED — Receiver or converter covering 152-157 mcs FM for 6v mobile. For cash or trade tape recorder, 3-30 Gonset, or photo equipment. Martin Goffe, 1011 44th St., Brooklyn 19, N. Y.

FOR SALE — Radio City flyback and yoke tester, $30.; sweep gen. 610 Hickock, $75.; Eico pix tube tester, $15, all like new. 9-VT25 tubes $8.; 6-723A/13, 3CRP-72, 3-3B24, all for $12., plus postage. John Haliday, Box 100, Indiana, Pa.

FOR SALE — Heathkit SP-2 Stereo Preamp, $50. Knight 83YU777 basic 60w stereo amp with cover, $85. Both wired professionally in very good condition. You pay express charges. George Sisk, 1314 N. Courthouse Rd., Arlington 1, Va.

FOR SALE — Riders Radio Manuals, 1-16, good condition. Make offer. F. A. McGonigle, 224 Florence Ave., Wilmington 3, Del.

FOR SALE — NRI communication course, complete with all lessons, microphone, modulator, and assembled xmitter, $68. Will ship prepaid. Wilbur Newcomb, 3232 Ellsworth St., NE, Roanoke, Va.

FOR SALE — Harvey-Wells TBS 50 D, $65., APS-50 AC power supply, $18., RME MB3 Monitor, $15., Millen 90671 SWR bridge, $8., Eldico A-300 antenna tuner, $12., instructograph code teacher, $10. Robert Gossett, 15 Pine Ridge Rd., Weymouth 89, Mass.

FOR SALE — Heath FM3 tuner completely wired and tested, very good condition, $20. Local only. H. Heynick, 2601 Glenwood Rd., Brooklyn 10, N. Y.

SWAP — ITI Radio TV servicing course for CREI, CIRE, Grantham or other TV servicing course. Dean Somerville, 503 W. Arnold, Marshfield, Wis.

FOR SALE — Resistance decade box by Precise Development Corp., 1% accuracy readings from 10 ohms to 1, 111, 110 ohms in five decades, $10; Heathkit grid-dip meter, GD-1B, $18. Both like new. William Jung, 4 Himmelmann Place, San Francisco, Calif.

FOR SALE — Triplett 3434-A TV-FM sweep and marker generator, like new, with manual, best offer. 5" Heath-kit scope very good condition. Chester Szalek, 1404 Plain St., Peru, Ill.

SELL or TRADE — Eico A460 field strength meter, Simpson 381 capacity bridge; Superior TV30 sig. gen.; DeVry tech. 5" scope, Photofacts. Interested in tape recorder or camera equipment. Art Lowe, Box 3, Farmersburg, Ind.

SELL or TRADE — Sel-Son CRT substituter, pix tube tester. Want sweep gen., tape recorder, or scope. J. J. Hitzenhammer, 1319-25th St., Richmond, Calif.

FOR SALE — Riders TV manuals 4-8, $6. each. Hickok 620 linearity gen. $35. Feiler TS-3A stethescope, $16. 16" TV chassis, $6. Tube caddy. Ace TV, 5341 Cordelia Ave., Baltimore 15, Md.

TRADE — Ham Gear and parts for marine equipment, compass, depth indicator, direction finder, etc. V. Barker, Woodside Dr., Freeport, Ill.

WANTED — DC Power supply for Collins ART-13 xmitter. State price. Harold Dieter, 143 Wilson Av., Long Beach, N.Y.

WANTED — Set of IF coils from BC 453 (85-kc). Will sell Riders Radio manuals, SCR 522 xmitters, SX99 receiver. E. L. Felder, Tylertown, Miss.

FOR SALE — WRL Globe Chief xmitter 1/n, reasonable. Donald C. Morehouse, 822 Lawrence St., Watertown, N. Y.

SWAP or SELL — 2 Electro-Voice, 1 COAX UHF converters for Gonset 3012 converter 12v at 152-162 mc. H. Parks, 410-12 St. Maimi Beach 39, Fla.

FOR SALE — Heathkit T4 $15, Eico utility 540 tester $10, illuminated airguide auto compass, $4., Audio tape 7" acetate, $1. 16 mm movie film roll, $1. Empty spools 5c, Heath hi voltage probe, $3. Johnnie, 8561 66 Rd., Forest Hills, L. I., N. Y.

FOR SALE — 5 Radio & TV test equipments, also books, diagrams, all for $250. Andy Matviya, Jr., 47½ E. Chestnut, Blairsville, Pa.

FOR SALE — Unused Heathkit TS-4A TV alignment gen., $59.95, assembled and calibrated. Arvin 6 transistor pocket portable radio, slightly used, $35. B. H. Gran, 410 So. 5th St., LeSueur, Minn.

FOR SALE — Radio TV parts, speakers, resistors, tubes, radios, chassis, amps, mobile PA etc. Pat McDonald, 195 Prince St., New York 12, N. Y.

FOR SALE — 25w modulator-power supply panel mounted, $20. DB23-A preselector (30db gain), $30. 810 tube never used, (Jan.), $7. 10 meter VFO, $5. Pick-up only. Kaila, 37-08 30 Ave., Astoria, L. I. N. Y.

WANTED — Ampex or Tandberg 5 stereo recorders, WE9-A arm and cartridge, preferably with LP or stereo adaptor, also speakers, baffles, mikes, turntables, Majestic-Grundig AM-FM with stereophono in console. Associated, 13-00 Plaza Rd., Fair Lawn, N. J.

WANTED — Used Zenith power trans. #95-1197 for 23G22 or 23G23 TV chassis. State condition and price. Edwin C. Eisenbeis, 2813 Sheila Dr., Louisville 5, Ky.

FOR SALE — Millen 500w RF amp type 90881, includes: pair 812's, pair 866's, 2 filament xmfrs, coils, Thordason T19P60 plate xmfr, other power supply components, and desktop cabinet. Best offer over $85. Edgar Naratil, 423 Lafayette, Palmerton, Pa.

WANTED — Old stamp collections for donation to youngsters in orphanage, U. S., foreign, on or off paper. All kinds. F. L. Schiel, 615 Glenwood St., Waterloo, Iowa.

TRADE — 45 unused up-to-date books on electronics, for good speaker. Prefer 15" Altec. Thomas G. Ravesi, 99 Rockridge Rd., Waltham 54, Mass.

WANTED — Working or not. National HFS, RME 84, DB22A, MB-3, SP-5, Millen 90281, 90700, 90800, 90810, 90811, Cardwell PL-20, 024, Meissner 10-1207, B & W freq. mult. Walt Barry, 1229 Edgehill Rd., Darby, Pa.

FOR SALE — BC442 relay, 456 modulator, 375 tuning unit; control boxes; BC 229, 453, 733D receivers, BC 430, 457, 458, 459 xmtrs; 1N82A xtals, tubes, etc. D. T. Willis, 140 S. Jackson, Tucumcari, N. M.

FOR SALE — Screen print course and beginner's supplies. Slightly used. Cost about $50., for best cash offer or trade. L. L. Bender, Box 455, Sealy, Texas.

SELL or TRADE — Hallicrafters receiver S-38D for typewriter, VTVM not more than 3 years old and in good condition, or cash. Paul Blomquist, 158 North Ave., Haverhill, Mass.

FOR SALE — 30w novice xmitter, with built-in power supply, code monitor, pi net., covers 80, 40, and 15 meters, $25. 20, 15, 10 meter converter for BC-454 or any other 80 meter receiver, $10. Both with schematic. Dave Howarter, 85 West Vine, Canton, Ill.

FOR SALE — RCA Color TV Picto-guide, $3. Good standard coil tuner 21 mc IF less tubes, $3. S. Egelberg, 3029 Matthews Ave., Bronx 67, N. Y.

WANTED — 50,000 ohm potentiometer 15-25w as replacement in Sprague TO-3 condenser checker, or any used TO-3 or TO-4 tester. Herbert Hoch, 418 E. 53 St., Brooklyn 3, N. Y.

FOR SALE — KT 66's, $4 per pair, postpaid. Power xformers and filter chokes. What type do you need? H. Halamud, 122 Eames Place, Bronx 68, N. Y.

FOR SALE — Radio & TV service equipment and parts. Send for list. Melvin Kilhefner, 270 Duke St., Ephrata, Pa.

WANTED — Monkey automatic key. For cash or will trade Millen R9er with 10M coils or other items. B. A. Skurnowicz, Gouldsboro, Pa.

FOR SALE — Jensen 530 Hi-Fi 15" Coaxial Speaker, slightly used, $75. Anthony J. Tiso, 15 Pease St., Mount Vernon, N. Y.

FOR SALE — BC-929 surplus scope, converted 117 VAC at 60 cycles, $17. Surplus mobile dynamotor, like new, $5.50. Surplus package-parts sale, as-as units R-39/ARN-5A, BC-654, BC-1206 coil-set, FT-220 rack, $9. Victor Wong, 430 Southview Ave., Cincinnati 19, Ohio.

FOR SALE — Riders 1 thru 13 and for year 1931, very good condition, $50. for lot only. Not separately. LeRoy M. Winans, 14901 Evers Ave., Dolton, Ill.

TRADE — 5" RCA scope, or Precision VTVM for Jackson 707 CRT Analyzer. Colan Doerr, 741 Jackson Ave., Memphis 5, Tenn.

WANTED — BC348 and manuals. State condition and price. M. Marshall, 455 Washington Ave., Dumont, N. J.

FOR SALE — Heathkit TS-4A TV alignment gen., assembled and in operating condition, like new, $30. E. J. Bassler, 3402 W. Cortland, Chicago 47, Ill.

SELL or TRADE — RCA 154 beat frequency oscillator, 30 cycles to 15kc, $17.95. Need Heath CM-1 capacity meter or test equip. and instruction book for Triplett 1696 modulation monitor. Walter E. Noble, Box 505, Campbell, Calif.

FOR SALE — Globe Scout 680-A xmitter, Globe 755-A VFO, factory wired, perfect. J-T 30 mike. J-38 key. 100 ft. 72 ohm Coax. 40 and 80 meter novice xtals, $150. COD. Bill Nelson, 701 W. Church St., Berryville, Ark.

FOR SALE — Heath O-10 lab scope with demodulator probe 337-C and low cap. probe 342, factory aligned, $40. FOB complete. Thos. M. Jones, 217 W. McArthur St., Corunna, Mich.

SELL or TRADE — BC653 transmitter, TG30 telegraph repeater, Weston Sentrol 705 relay, and several replacement scope xformers. Need GDO and Citizens Band equipment. Francis Hillibush, RD 1, Ringtown, Pa.

WANT — Ham and surplus equip., '48 to '59 QST and CQ mags. Trade Heath/-AR-3, SG-8, Sprayberry course less kits, science fiction books, new army codan, 10 meter whip. Lou Wright, Eagle Grove, Iowa.

FOR SALE — Electric Institute home-study course, 10 lessons, on Business Organization and Operation, $9.50, or $1.50 ea. M. W. Mackey, 3211 W. Beach Ave., Chicago, Ill.

FOR SALE — G. I. R-70 recording and phono assembly, 78 and 33 1/3 RPM in carrying case and technical bulletin, $12. plus postage. G. E. 250 Portable Radio, very good condition needs storage battery, $18. Al Crispo, 8502, 133 Ave., Ozone Park 17, N. Y.

FOR SALE — 2 JFD Corsair, 5 element Yogi TV antennas for Channel 4, $6. each, 2 for $10. Taco Supercharger (antenna amp) for Channel 4, sac., $15. A. G. Jolly, Engelhard, N. C.

FOR SALE — Radio & TV Service Shop complete. For complete info write S. R. Valone, Box 1262, Tavares, Fla.

CLEANING HOUSE — Sonar 10 meter receiver with 6v vibrapack; McMurdo-Silver xmitter 50w modulated; 6v filtered dynamotor supply with relay; Millen grid-dip meter like new; Homebrew 6146 xmitter 160-20 with modulator. Best offer takes all or part. Tom Snyder, 306 Bickmore Dr., Wallingford, Pa.

FOR SALE — Bell RC-47A Disc Recorder (record player and cutter), 33 1/3, 45, 78, $90. Knight 25w mobile sound, 6-12-110v with Electro-Voice projectors, mike with 2 stands, extra cables, etc., $150. SX-62-A Rcvr. David Fisher, Box 125, Monroeton, Pa.

SELL — Heath AM-1 antenna impedance meter, $12.50. Deluxe 6' Bud Rack CR-1777 (no door), $30. 6' Open Rack, $15. All postpaid. R. E. Neal, 425 South Edgemont Cir, Huntsville, Ala.

SELL — Heath: tube tester, TC-1, with TV adaptor $18.50; VTVM, V4A, $17.50; Sig. Gen., SG-7, $12.50; Amp., A-4, $7.50. All good condition. FOB. G. Brause, 201 Otsego Ave., San Francisco, Calif.

SELL or SWAP — BC923A 4 tuning heads xtal control 27 to 39 mc., Hi-Fi Knight tape recorder 3 speed, German Luger 1920 model, tube caddy. Want model radio control equip. Radio Clinic, 845 Allingham, St., Van Wert, Ohio

FOR SALE — GM570-404 lab Galvanometer, 110v lamp, very good condition, 80 divisions, .213 microamp or 3.41 microvolts per div., $34. Thackrey, 1170 Riviera Dr., Pasadena, Calif.

WANTED — General Radio Polaroid camera mount for 5" scope. State model and price. Howard M. Tremaine, 586 N. Windsor Blvd., Hollywood 4, Calif.

WANTED — Tech manuals for Navy RCK BC950 (modulated VHF ARC-5 xmtr), and 522 and Navy UHF antenna 66147 for RDZ and URR-9. C. R. Wilson, 61 Warwick St., Portland, Maine.

WANTED — Eico, RCA or similar VTVM in good condition. Zenith H725 or K725 radios. Walter Whitcomb, 911 NW 31st St., Oklahoma City 18, Okla.

WANTED TO BUY — Battery operated portable field strength meter. Redd's Radio & TV Service, Box 12, Union Furnace, Ohio.

FOR SALE — Transmitter, 65w AM phone only, lab built to commercial standards, including Heath VFO, mike, triple power supply, antenna relay, $125. Want Gonset or similar VHF AM aircraft receiver, 112 to 136 mc. Peter Rosenbaum, 2962 S. Vrain, Denver 19, Colo.

FOR SALE — Like new, Bell 213 stereomon. record-playback tape deck plus 2 RP120 preamps, $220. Craftsman C800 custom Hi-Fi AM-FM tuner, $85. Mahog. component cabinet, best offer over $20. G. Dalamango, 160-26 26 Ave., Flushing, N. Y.

FOR SALE — Knight in-circuit capacitor checker with instruction book, wired ready for service, $10. Irving Levin, 62-34 99th St., Rego Park, L. I., N. Y.

FOR SALE — Dynamotor 28v to 260v @ 60 ma.; a 10 mfd - 1000v oil cond.; 25 power resistors and 250 ½, 1 and 2 W. Resistors. All for $5. S. S. Brody, 211-10 73rd Ave., Flushing 64, N. Y.

SWAP — Rebuilt Buescher alto sax and new case. Want tape recorder or TV set. Ray Green, Box 50, Milford, Mass.

SWAP or SELL — f2.9 15cm Plaubel anticomar lens in barrel mount with iris diaphragm in 4x5 Graphic camera. Want mutual conductance tube tester, Hickok, Simpson, or equal in good condition; or make offer. C. R. Iseminger, 1425 Lawndale, Havertown, Pa.

FOR SALE — Radio & TV parts, schematics, motors, manuals and books. Send for list. Selcraft, Box 394, Spring Valley, N. Y.

WANTED — Early radio gear, prior 1928, such as Atwater-Kent, Grebe, Kennedy, Radiolas, Westinghouse, DeForest, Magnavox, etc., loose couplers, tubes and parts. Paul Giganti, 2429 San Carlos Ave., San Carlos, Calif.

FOR SALE — Admiral record changer-player, $10; RCA 45 changer-player, $12; Jukebox amplifier, $5; Print-O-Press Rotary duplicator, $25; woodturning lathe, $19. Want typewriter, adders, duplicators, printing presses, type, etc. Keller, Mem'ry Lane, Linlithgo, N. Y.

SELL OR SWAP — 5" Eico 425 push-pull scope; Heath RF signal gen. SG-6; Central Electronics 10-A multiphase exciter; inverter 110 AC in, 110 DC out. Want beams, rotators, 16 mm or photo gear. Leo T. Meister, 321 River Road, Nutley 10, N. J.

WANTED — Vacuum tester, for checking vacuum cleaner suction power, complete with attachments. Give complete specifications. Fauke Electric, 1350 Fairfax St., Carlyle, Ill.

WANTED — Information or schematic of power unit to ZB-2 Navy aircraft radio homing adapter equipment, freq. 234 to 258 Mc., also accessories 1CZR-69076. S/Sgt. Herman Powell, Box 512, 837th ABGRU, Shaw AFB, South Carolina.

FOR SALE — Heathkit VFO, $14.95, BC-545 rcvr, converted 75 meter phone with power supply, $13; ARC-5 rcvr. converted for 10 meter, with power supply, $13; pair 812 tubes, $4. Fred Ouellette, 616 Highland Ave., Kenmore 23, N. Y.

NEED — Schematic and/or service notes on LM-14 freq. meter and power supply. Joe Wright, Box 1158, Rockport, Tex.

FOR SALE — Hickok 209A volt ohm capacity milliammeter and 288X sig. gen.; also Approved field strength meter. All in fine condition. Best offer. John F. Drinon, Middleburg, N. Y.

FOR SALE — Allied Knight tuner kit AM-FM, assembled and operating, needs alignment, $45 plus postage. D. L. Jaffe, 8658 Piney Branch Rd., Silver Spring, Md.

WANTED — Schematic for Farnsworth AC-56 broadcast and short-wave radio. Buy, borrow, or rent. Samuel Zano, 509-2nd St., Brooklyn 15, N. Y.

FOR SALE — Riders 1 to 12, $30 FOB. R. M. Smith, 3534 First Avenue N.E., Cedar Rapids, Iowa.

FOR SALE — Heathkit SG-8 r.f. sig. gen., wired, tested and guaranteed, $26.95. Williamson Radio - TV Service, 631 W. Dallas, Cooper, Tex.

TRADE — Very good Heath AR-2 rcvr with cabinet and manuals for Heath tube checker or ham gear. J. B. Parker, 2330 So. Main, Wichita, Kan.

WANTED — To borrow, buy, or rent schematic for BC-639 VHF rec'r. Sell NC-100X in exceptional condition, $75. H. Marshall, R3, Box 159, Racine, Wis.

SELL OR TRADE — C-D TR-2 Tele-Rotor with 75 ft. of cable. Make offer or trade for TV antenna with masts, lead-in cable, etc. C. Baye, 100 Arden St., New York 40, N. Y.

WANTED — B-K 1075 TV analyst in good cond., for cash; also flyback tester and up-to-date quick check tube tester. Modern Electric, 117 E. Bellville, Marion, Ky.

SERVICE — Repairs on all types of industrial electronic equipment. Altron Electronics, 409 East 7th St., Chester, Pa.

FOR SALE — Superior CRT tube testers TV40 and TU-11 and Multitester 670A for best offer. Robert Johnson, 3802 N. 97 Pl., Milwaukee 16, Wis.

FOR SALE — Heath 0-12 scope with all probes, used only few hours, $80. Jack Fives, 2916 Rockrose Ave., Baltimore 15, Maryland.

WANTED — Nazi medals and souvenirs. Have beat frequency metal locator, wired but not operating condition, parts worth $25. Rudi Franke, 4 Berlant Ave., Linden, N. J.

WANTED — 5-8 transistor pocket radio. Will trade TT gauge H.P. 0-6-0 locomotive. Robert L. English, 875 Grafton Rd., Newark, Ohio.

WANTED — Complete 2-way transceivers, for FCC business or citizen band operation; RW phone and CW rig; 20 meter beam. A. Haberman, 129 Morgan St., Holyoke, Mass.

WANTED — 15" Altec 604C or Jim Lansing D130, even if cone is damaged. Must be a bargain. Theodore Nadeje, 5101-AA 39th Ave., Sunnyside 4, N. Y.

WANTED — Western Electric 653F input transformer. H. J. Cornelius, 174 Union Ave., New Providence, N. J.

TRADE OR SELL — Pair Vocaline citizens band transceivers, for audio amplifier, tape recorder, or 100 w. 6 v. DC to 110 v. AC inverter. Electronic Service, 4918 Beech St., Hammond, Ind.

WANTED — Several 16-ohm drivers. State price, Anthony Indingaro, 47 Monmouth St., East Boston 28, Mass.

WANTED — For cash — used '57-'58 Plymouth car radio, prefer Mopar with front mtg. panel, in any cond. State model and condition. Wong, 1475 Shotwell St., San Francisco 10, Calif.

SELL OR SWAP — Superior 700 Multimeter in A-1 shape, battery powered, for cash or portable typewriter. V. J. Figas, Box 393, Hopwood, Pa.

BEST OFFER — Sams Photofacts, 1 thru 370. Crose TV Service, 102 No. Clifton, Park Ridge, Ill.

WANTED — Bird 61 r.f. wattmeter and omni generator such as ARC H-14. Center Electronics, 867 Broad Street, Central Falls, R. I.

WANTED — Early wireless gear, Kennedy 110 and amplifier, Mignon, Electro Importing or Duck Loose coupler. Trade QST dated prior 1924; QST file 1922 to 1950; IRE issues 1952-54. Luther E. Harrison, 2410 Salerno Drive, Dallas, Tex.

NEED — March 1959 issue of Popular Electronics. E. N. Christner, 313 Crawford St., Middletown, Ohio.

FOR SALE — S-85 Hallicrafters receiver, very good condition, $75. R. Fijewski, 100 E. Lindsley Rd., Cedar Grove, N. J.

WANTED — APR-4, tuning units, especially TN17, TN18; 16 mm C-mount movie lens, wide angle, 5" - 1.5, for cash or trade Hickok TV test equipment, ham gear, etc., Robert Franks, 29 Gould Ave., Bedford, Ohio.

FOR SALE — Kay model 110 calibrated megasweep, instruction book and spare klystron included, $200 postpaid. W. J. Baker, S.J., St. Mary's College, St. Marys, Kan.

FOR SALE — Motorola TS18 TV set, good 8BP4 picture tube. Best offer. A. J. Schwarz, 5725 N. Talman Ave., Chicago 45, Ill.

FOR SALE — NRI comm. course, less kits, $15; Vol. 2 Elect. Tech. 101-TV Radio schematics, $2; Prac. Radio Communications, by Nelson-Horning, $4; Fundamentals of Radio, $3. Bert F. Lalonde, 745 17th St., Port Huron, Mich.

SELL OR TRADE — Precise 912 RF and 999 high voltage probes; man's 15-jewel pocket Elgin watch, keeps perfect time. Wantted good FM receiver 30-50 and 152-174 Mc. bands with squelch. G. D. Griffin, 322 West State, Ithaca, N. Y.

FOR SALE — ARC 5 xmitter 10, 11, 40, 75, 80 meters, complete with power supply, modulator, relay power supply, 70 w. out., fone, 110 CW de-TVI'd, fine; Hallicrafter S38E in fair condition. Best offer. Local only. Ron Marx, 1307 Ed. L. Grant Hyway, Bronx 52, N. Y.

FOR SALE — Supreme 600 tube and set tester with all manuals and last tube test chart, metal portable case, in very good cond., $70 plus shipping. Albert C. Hart, 207 No. Raymond St., Griffith, Ind.

SELL OR TRADE — 12" electromagnet spkr. and output transformer, very good cond., $2.50; power filament, auto transformers. Need tubes 807, 6AG7, and 40 mtr. novice xtal. Tommy Milsaps, 1108 W. Montgomery Ave., Sheffield, Ala.

SELL — Zenith Trans - Oceanic portable, covers BC to 31 Mc, very good cond., instructions intact. W. E. Loomis, 1033 East St. Joe St., Lansing 12, Mich.

POSITION WANTED — First-class radiotelephone-telegraph, 20 yrs. ham radio, 10 yrs. teaching electronics, 10 yrs. R&D. Washington area or southern Pennsylvania. Trade radio servicing instruments for late comm. rcvr. Karl Stello, 4504 Hartwick Rd., College Park, Md.

FOR SALE — Pickering 350 flux valve mono. phono cartridge, 1 mil and ½ mil diamond and 2.7 mil sapphire stylus, $20; model D140, $5; Heath XO-1 Electronic cross-over, $15. H. T. Wray, 716 Brafferton Dr., Pittsburgh 34, Pa.

TRADE OR SELL — Dukane 4B10 intercom up to 10 remote station, for smaller unit. Have good electric clocks, back copies of Technician for P.F. Reporter or other manuals. Frank Mordini, Highwood, Ill.

FOR SALE — U.H.F. converters: Mallory, Granco, Alliance, and Regency, all in good cond. William R. Hall, 1605 Polk St., San Francisco 9, Calif.
N. Y.

FOR SALE — Hallicrafters S-47 SW rcvr with diagrams, $75 FOB. Steven Eckers, 80-50 210 St., Queens Village 27, L. I.,

---

TRADE OR SELL — Webcor 2950-1 3-speed stereotape deck, $185 plus postage or trade even-up on T-1500 Wollensak up to T-1600; '58 Handbook and S106 Conversion, $2 ea. E. Mick, 515 Buxmont St., Philadelphia 16, Pa.

FOR SALE — Eico 221 VTVM with high voltage probe and crystal probe, instructions, first-class shape, factory-built, $15 COD. John H. McHocko, 205 South 11 St., Easton, Pa.

WANTED — Milliameter, other test equipment, and AM-FM radio, state model, cond., and price. Ed Dustin, 114 W. 21st St., Topeka, Kan.

WANTED — Heath or Hickok test equipment, any age or cond., give lowest asking price. Ralph Buffington TV, 1113 30th St., Rockford, Ill.

WANTED — Like new Gonset Super - 12 mobile converter, cash or trade for l. n. Gonset Tri-Band mobile converter. Edwin Eisenbeis, 2813 Sheila Dr., Louisville 5, Kentucky.

TRADE — Baush & Lomb 7 x 50 binoculars, coated optics, individual focus, in good cond., with case, for good tape recorder or fine 35 mm or reflex camera. Walter Baer, 741 State, Lancaster, Pa.

SELL — Complete Screen Point course or trade for good small radio. L. L. Bender, Box 455, Sealy, Texas.

SELL — NRI 33 professional sig. tracer and NRI tube checker, $35 each; 24" Silvertone TV console, $20. Ernest Beard, DeMotte, Ind.

FOR SALE — Heath Mohawk and Apache (kit price); Harvey-Wells TBS50D, $60 FOB. All in very good cond. R. Banaszak, 10349 Avenue "O", Chicago 17, Ill.

FOR SALE — NRI Radio and TV correspondence course without equip., good cond., like new, $25. S. Moliver, 2992 W. 31st St., Coney Island, N. Y.

FOR SALE — Portable test tower, cranks up to 60', asking $150, not delivered. Lindemann TV, Oberlin, Kan.

FOR SALE — RME DB23 preselector, $25. Local sale only. Louis Tonik, 1204 Passmore St., Philadelphia 11, Pa.

SELL OR TRADE — Zenith Hi-Fi chassis 9E21, 550-1600 Kc AM, 38-44 Mc FM, 88-108 Mc FM, serv. data, escutcheon plate, PM speaker. In very good condition. Al Werhan, Manlius, N. Y.

WANTED — Meissner analyst 10-1154 or older model, also diagram of circuit and manual for Hickok 510X tube tester, any condition. N. B. Schoby, 2211 So. 14th St., Springfield, Ill.

WANTED — 7" Hallicrafters TV with push-button tuner, model 505 or T-54, does not have ot be working. Ed's TV Service, 399 School St., Watertown 72, Mass.

WANTED — B&K 400 CRT rejuvenator and complete set of Sams folders. Must be reasonable. Novacs TV Service, Tyndall, South Dakota.

FOR SALE — Precision tube tester and 2 other testers, large box of tubes and electric odds and ends. Mrs. Joe Ries, 2805 So. 8th St., Apt. 361A, Arlington, Va.

WANTED — Volume 1 and 2 of Electronic Technician Circuit Digest. Milton Leiser, 305 E. Mt. Eden Ave., New York 57, N. Y.

BEST OFFER — Radio-Electronics magazines from Dec. 1953 to Sept. 1958, very good condition. Leonard E. Polikoff, 22 Shelly Lane, Bethpage, L. I., N. Y.

FOR SALE — Mallory UHF converter, $12; noise suppressor kit and instructions, $1.25; 300 w. AM-CW xmitter, needs repairs, $65. Crowley, Box 62, R. 1, Oak Ridge, N. J.

SERVICE — Kits assembled, all makes, fast service. Send kit (not tampered with) and 15% of cost or cost plus 20% and I will order. Assembled units rushed express collect. Hausman Hi-Fi, 5104 West Center St., Milwaukee 10, Wis.

FOR SALE — Complete shop: Precision scope, sweep and sig. gen., Heath condenser checker and 6-12 v. batt. elim., Feiler tracer, Eico tube tester, Simpson VOM tubes, caddy, tools, etc. Half price, $600. Frank Plonka, 101 Hadwin Street, Central Falls, R. I.

FOR SALE — Riders radio manuals 1 to 22 inclusive, $85 complete, and TV manuals 1 to 5 inclusive, complete, new cond., $50. A. Grimmer, 1158 E. 29th St., Brooklyn 10, N. Y.

FOR SALE — Heath C-3 condenser checker for any reasonable offer. Want signal tracer of any make. James Dunn, R. 1, Sycamore, Pa.

FOR SALE — SX-96 receiver, $165; 4 element 10 mtr. Skyraider beam, $30; AR22 rotator, $22; Bud 100 Kc crystal calibrator 110 v. AC, $12.50. Roger Cooper, 7921 Chastain Pl., Reseda, Calif.

SELL OR TRADE — 829B, 4-2E26, portable amp. and mike, TV trans., old type tubes. Want Sams 150 and up, Heath bar and dot gen., or what have you? Elmer Lenz, 7717 39 Ave., Kenosha, Wis.

SELL OR SWAP — UTC power trans. S-47, 3000 - 2500 - 2000 v. AC; CT-300 MA, UTC universal mod. trans. S-21, H.V. filters and chokes, meters and xtals. A-1, half of net cost. B. Rutkowski, 5030 Walsh Ave., East Chicago, Ind.

SELL OR TRADE — Harvey-Wells TBS-50-D, VFO; Mallard 20 m. mobile converter; Johnson lo-pass filter; Hallicrafters R-46 speaker; Turner S22D dynamic mike on Shure S36 base. Want ham receiver. Sumner Weisman, 253 Tacoma Street, Worcester, Mass.

FOR SALE — Clean, almost new books: ARRL Antenna book; Mobile Radio, by Leo G. Sands; Test Scope Tracer, Rider; Basic Television, Vol. 1, The Transmitter; Low Power Telecasting. $10 for all books. Robert Haas, 49 Grandview Ave., Ft. Thomas, Ky.

WANTED — Coil sets for National HRO-7, receiver 21 Mc AC and 14 Mc B coils. Will pay cash for clean coil set. W. Davis, 19227 Lemay St., Reseda, Calif.

FOR SALE — Hi-Fi 10 w. amplifier; Capehart AK256, Hi-Fi spkr enclosed cabinet, blonde, 24 x 18 x 14 inches; Garrard RC 120/4D changer. Best offer over $100 takes it. Rocco Rositano, 296 Ave. W., Brooklyn 23, N. Y.

SELL OR TRADE — Eico model 666 tube and transistor tester; RCA WV-77E volt-ohmyst; I.B.M. electric typewriter. Selco Products, Danvers, Mass.

FOR SALE — Hickok 610-A TV alignment signal generator, like new, $45. Thoro Radio Service, 2152 Grand Ave., Baldwin L. I., N. Y.

FOR SALE — Recording tape, Audio 1200' x 7" dia., used once, 6 reels, $7.95, 12 reels $14.95, 24 reels $29, also two speed tape recorder FOB. R. Bradly, Box 62, Evanston, Ill.

FOR SALE — SX-100 and matching spkr, like new in orig. cartons, $200 and arrange pick-up. C. T. Allen, 51 Marion St., Carteret, N. J.

WANTED — Radio sets using loktal type tubes. Have loktals for sale or exchange. O. Zetlmeier, 1123 Woodycrest Ave., New York 52, N. Y.

FOR SALE — Eldico TRI TV 300 w. transmitter, $200; Meissner EX signal shifter band switching, screen for TVI with NBFM phone unit, $40. Both for $230. Viking mobile transmitter, $65 and VFO $20. Both for $75. All FOB. Lonnie M. Utt, Cana, Va.

FOR SALE — Eico 425K 5" scope, fully wired and in very good condition, graph screen, almost new, $44.95 plus postage. Also miscellaneous parts. Norman Silber, 3415 Virginia Ct., Tampa 9, Fla.

FOR SALE — Approx. 1,000 radio and TV tubes. Send for list. Take reasonable offer for complete lot. J. Distefano, 215 Alcazar Ave., Coral Gables, Fla.

WANTED — Radio tube 25B8. Prefer unused but will buy used with good emission. Langevin T.V., 787 Roosevelt Ave., Pawtucket, R. I.

WANTED — Information on Communication Measurement Lab. broad band converter 50-54 Mc, model BB-50, diagram and operational data. C. F. Lustick, 5924 Hasbrook Ave., Philadelphia 20, Pa.

FOR SALE — Sola 2000 w. constant voltage transformer, $50; Sams Photofacts 50-250, $100; DX20 transmitter, $25; isolation transformer, $10; radio course, $10; resistors, $1 per hundred. All FOB. J. Wright, 2319 E. Indianola, Phoenix, Ariz.

SWAP OR SELL — Brush BL221 single channel oscillograph, has ink stylus and electric with power supply, extra paper. Want good gun or cash. M. H. Dean, 18904 Santa Maria, Castro Valley, Calif.

FOR SALE — Building 20' x 30', attractive, $3,500. All service manuals, supplies, and equipment, inventory about $4,000. All for $5,000. Write for details. Thompson Radio TV, 207 E. Ave., Columbus, Kan.

FOR SALE — Test panel with mounted equipment: condenser analyzer, signal generator, tube tester, milliammeter, volt and amp metered electrical outlet, all for $35. Charles Boyer, Jr., R. 2, Liverpool, Pa.

FOR SALE — Plate transformers: 3A cased, 115 v. tapped primary, secondary 2650 CT to 1850 CT, standoff insulator terminals, $9.95. Shipped COD. W. H. Frost, 238 McCreery Ave., San Jose 27, Calif.

WANTED — Sonar V-12 VFO, good cond., state price. E. V. Folta, Jr., 3520 No. New England Ave., Chicago 34, Ill.

WANTED — Emerson TV-radio combination, approximately 8" tube, desk model. L. Albert Webb, 56 Suffolk St., Holyoke, Mass.

SELL OR TRADE — Westinghouse 2-band 232E SW and standard broadcast rcvr, $25; Eico 221 VTVM, good cond., $15, or trade all for communications rcvr. or xmitter. Douglas Weber, 136-42 Maple Ave., Flushing 55, N. Y.

FOR SALE — Sylvania: 500 sweep gen., 501 marker gen., 400 scope, 300 voltage calibrator, 220 tube tester, 216 FM-AM sig. gen., 221-Z Polymeter, VTVM. Never used, original cartons. No reasonable offer refused. W. J. Stack, Rt. 1, Delmar, Iowa.

SELL OR SWAP — Heathkit RC-1 radiation counter, very good condition for good 'scope or $50. Gerald Le Fevre, York Rd., Pavilion, N. Y.

FOR SALE — Heath WA-P2 Hi-Fi preamplifier, $15; Globe DSB-100 sideband transmitter, factory wired, unused, $110 FOB. Cliff Falls, Box 113, Bay Village, Ohio.

QUITTING TV BUSINESS — Sell tubes, service manuals and notes, test equipment, 100 w. audio trans., 1 Kw GE variable voltage xformer, radio and TV parts. Need 1" CRO tube, 5W class B driver xformer and meters. D. Buck, 32 Ardmore Terr., Collingswood, N. J.

FOR SALE — Complete Radio-TV business, shop equipment including Frigidaire air conditioning unit, vacuum tube meters, scopes, tube testers, set of Riders, 250 Sams. Business established in 1940. A bargain. H. A. Carver, Revenna, Ohio.

WANTED — Old radio equipment: Radiola, Zenith, Murdock, Clapp Eastham, De Forest, Baldwin, Duck, Arnold, etc., period 1914-1930. W. Nangle, Box 341, Oklahoma City 1, Okla.

WANTED — Sams Photofact empty binders. Quote quantity and price. J. W. Bunn, North Branch, N. Y.

FOR SALE — 40 - 25 mhy RF chokes, $4; 40 xtal holders, $3; 40 Jones connector P310AB, $4; 200 potentiometers, $8; 200 Ferrule power resistors, $4. W. Kalmanson, 80 St. Marks Pl., Staten Island 1, N. Y.

SWAP — Transistors, tubes, parts, etc., for good mineral specimens such as Apatite, Chrysoberyl, Fluorite, Galena, etc. Send for list. Leonard D'Airo, Box 1025, Bayville, L. I., N. Y.

FOR SALE — Freq. meter, $20; transistorized grid dip meter, $35; tape deck, $60; power supplies, meters, xformers, transistor tester, etc. J. Chang, 127 Great East Neck Rd., Babylon, N. Y.

SWAP — Recent National Schools Servicing and Comm. course, complete, less kits, for recent NRI Servicing course. Dean Faulwell, Tipton TV Service, Tipton, Mo.

WANTED — Elmac PMR-7 or Gonset 666-B in good working cond., lowest price. Prefer New York - New Jersey metropolitan area. Dom Papale, 34 MacArthur Ave., Lodi, N. J.

WANTED — Instruction manual for Superior model 1280 set tester (tube checker and multitester comb.). Will buy, rent, or borrow. A. Boudreau, 28 High Ct., East Hartford, Conn.

FOR SALE — 54-H Elmac push to talk mike, Gonset Super 6 converter both converted for 12V DM; 35D 12 v. dynamotor all for $100; Hammarlund HQ 100C with clock, nearly new $145. T.K. Brown, 1111 Chenango St., Binghamton, N. Y.

FOR SALE — NRI communication course, NRI VTVM in cabinet AC powered with RF head, both $32. R. B. Wilson, 210 Gridley St., Greenville, S. C.

WANTED — Teletype reperforator. Will trade M1 Carbine with bill of sale and extras. John Riley, 11600 Sherman Way, North Hollywood, Calif.

SELL OR TRADE — Eico signal tracer, car radios, radio tubes, record changer, for cash or trade for portable typewriter or guns. Jack Grant, Box 281, Coalgate, Oklahoma.

FOR SALE — Sherwood FM tuner S3000, Heathkit preamp., Dynakit amp. 50 w., Rondine Junior turntable, Rek-O-Kut arm, Fairchild cartridge .001 diamond stylus, Heathkit SB-1 and SB-2 speaker system. Very good cond. Roy C. Edwards, 151 Frederick St., New Bedford, Mass.

FOR SALE — Riders Radio manuals, 1 thru 14, and TV manuals, 1 thru 6. Sell all or part, make offer, FOB. J. V. Stout, 4640 York Rd., Baltimore 12, Md.

FOR SALE — Hammarlund HQ-150 rcvr and matching spkr, Moore SWR and meter unit, Eldico 52-75-ohm low pass filter, duo-matic electronic keyer AKS7, hy-gain AV-14 4-band trap vertical antenna. H. E. Leigh, Sr., 828 Nevada Ave., San Jose 25, Calif.

WANTED — Wide band scope: Eico, Heathkit, or reliable make in perfect cond.; sweep generator; Air Conditioning course, with or without kits. Edward Blisten, 2 Hinckley Pl., Brooklyn 18, N. Y.

WANTED — Auto radio to fit 1959 Nash Rambler. State price, condition, and make. M. Match, 1 Jacobus Pl., New York 63, N. Y.

WANTED — Portable battery field strength meter in good cond., state price. James W. Grimmette, Bruno 3, W. Va.

TRADE OR SELL — Like new B&K 500 tube tester, for Polaroid Land camera and accessories; or trade for 22 automatic or Western style 22 pistol. Tube tester, $65. H. M. Howell, 6851 Crawfordsville Rd., Indianapolis 24, Ind.

FOR SALE — RCA color tube 15GP22. Best offer accepted, prefer local. A. Malinick, 86 Whittier Dr., Thornwood, N. Y.

SELL — Eico 221 VTVM with leads $12.50; 320 sig. gen. $10; 360 sweep generator just repaired & calibrated by Eico $22.50; Heathkit TC-1 tube tester with pic tube adapter (homemade) $15; Precise 111 tube tester $70. All FOB. Walter Smart, 1 Lyman Ave., Saco, Maine.

WANTED — Schematics and assembling of TS-1A Heath TV gen. alignment. Charles Zapf, 1444 Patapsco St., Baltimore 30, Maryland.

FOR SALE — Heathkit signal tracer, like new, $9.50; antenna relay ceramic base, $4; two 304TL's in orig. carton, $5 ea.; 6 v. dynamotor, like new, 425 v., 375 mils., mounted on chassis with relays and filters, $14. Harlan Dewitz, Wisner, Neb.

WANTED — Polaroid Camera suitable for scope use; New York City vicinity only. Sell back issues IRE Proceedings, 1954 to 1957, mint cond.; and Dictaphone wax cylinder recorder. Make offer. J. J. Bobrow, 104-21 191st St., Hollis 12, N. Y.

WANTED — UTC LS55 output transformer, state price and cond. E. E. Nelson, 4108 E. Newton, Seattle 2, Wash.

FOR SALE — Heathkit FM3A tuner year old, completely assembled, factory aligned, $35. John J. Ruskey, 16 So. Prospect, Bradford, Mass.

SELL OR TRADE — Edmund 4 1/4" reflector telescope; National SW-3 receiver; several 3" meters. Want VTVM, VOM, scope, camera. Cannot ship scope. Benj. Chew, 2006 North John Russell, Philadelphia 17, Pa.

WANTED — Hallicrafters SX-28, SX-28A, or Hammarlund HQ-129X. Metropolitan area only. Harry Morelli, 3141 Sedgwick Ave., New York 63, N. Y.

FOR SALE — Motorola 2-way equipment, 147.3 mc. base station, mobile equip., Harvey - Wells TBS - 50 - D $80; Geiger, Scintillation counters; EV 647 mike, BC 1267, Siren Police receivers, ARC 5. D. C. Hale, 635 S. 21 Ave., Maywood, Ill.

FOR SALE — Model 12 Kleinschmidt Teletypewriter, includes printer, keybord, table and cover, 115 v. 60 cycle sync motors, very good operating condition, $50. Arthur Marko, 429 East 70th St., New York 21, N. Y.

FOR SALE — Harvey-Wells TBS50D transmitter and APS50 power supply, $85; Carter dynamotor 6 v. in., 400 v. 200 M.A. out., filtered, $25; BC-1206 Beacon receiver, $5; TR switch, $10. D. K. Lovett, 3629 Northwood Dr., Warren, Ohio.

SELL OR SWAP — 500 back issues QST, Electronics, RCA Review, and Proceedings of IRE, all or part. Make offer. L. F. Mach, 1221 So. 24th St., Omaha, Neb.

SELL OR SWAP — Kinevox 4 channel mixer, ham gear, recording misc. gear; NC-100A, Gonset G-28 communicator. Write for list. Bill L. Godden, 8718 E. 77th Terr., Kansas City 33, Mo.

FOR SALE — Amprobe 300, snap-around volt-ammeter, 600 volts, 300 amps. A-40 energizer increases sensitivity of Amprobe 10 times, test leads, cowhide carrying case, $40 prepaid. Bob Horst, 954 County Rd., B-2, St. Paul 13, Minn.

TRADE — Transistors, diodes, magic eye and other electronic material, for mint U.S. stamps, gold coins, valuable foreign stamps, orientalia: ivory, jade, quartz, etc. Satisfaction guaranteed. John J. Custer, 4455 Kissena Blvd., Flushing 55, N. Y.

FOR SALE — Elmac A54 50 w. mobile-portable xmtr. with AC power supply, $80. Sandy Greenwood, 1034 Stuyvesant Ave., Union, N. J.

FOR SALE — Slide rule, K&E log log decitrig duplex model 4081-35, in very good cond., $12 delivered, or trade for 15000 v. neon tube transformer. D. Kurs, 775 Plympton St., New Milford, N. J.

WANTED — Glass panel front or complete cabinet for Bendix model 753-M clock-radio. Tuck Electronics, Point of Rocks, Md.

FOR SALE — Seven Sams binders, very good cond., best offer over $1.50 each; also Sams 170, 189, 293, 119, 56, 57, $1.25 each, or will swap for other issues. J&M TV, 116½ Grove St., Rockville, Conn.

SELL OR SWAP — For ham gear: Popular Science magazines, 1936 to 1954 inclusive, in good cond., F. Lyman Will, 624 Ridge Ave., New Kensington, Pa.

FOR SALE — Minifon P55S pocket wire recorder, leather case, AC power supply, automobile connecting cord, patch cord for Hi-Fi, foot switch, 3 takeup spools, wire, crystal transducer microphone, $175. Frank Wirrer, 10529½ Ayres Ave., Los Angeles 64, Calif.

WANTED — 152 - 172 Mc. receiver; metal locator. R. Dick, Box 3152, Chicago 54, Ill.

FOR SALE — WV97A RCA Senior volt-ohmyst with WG289 high-voltage probe, WG222 direct/DC probe, WG264 RF probe, good condition, $50 complete with manual. Chester Martowicz, 83 E. 7th St., New York 3, N. Y.

SELL OR TRADE — Radio and TV tubes. Exchange lists. Precision CR-30 CRT checker, $22; 10-station Talkaphone intercom LS-10, $15. Andrews, 740 Maple St., Bethlehem, Pa.

SELL OR TRADE — Eico 950-B condenser-resistor checker, like new, factory tested, $21.50, and Knight in-circuit condenser checker, like new, $10. Consider trade for Photofacts or Riders. Fred Martin, 4216 Stonewall Ave., Richmond 25, Va.

FOR SALE — Stancor 202A transmitter with Sonar CFC VFO, 10 thru 80 meters, 100 w., complete with modulator, $75. Want tech. manuals for BC-221-AK and Telrad 18A Frequency Standard. George W. Brooks, 18 Country Way, Greenbush, Mass.

FOR RENT — One-man shop with living quarters, good for elderly man with funds who wants to taper off. Write fully about yourself. "Radio," Route 1, Box 76, Elsinore, Calif.

SWAP — Electronic parts and surplus tubes for magnetic recording tape. Also interested in chemical lab. apparatus and/or glassware. Reptile Research Laboratory, 429 N. Goodsell St., Evansville 8, Ind.

FOR SALE — Riders 1-5 abridged, 6 and 7, all for $10; BC-453 Q5er,, in original cond., $12; Hammarlund TCD-325-R transmitting cond., $5. Prices plus shipping charges. George Schafer, 82nd and Harrison Rd., Kansas City 33, Mo.

FOR SALE — Blonder-Tongue equipment, good cond.: 2 mixer amplifiers, MA4-1, each with CS-1 strips 2, 4, 5, and 6, $56.50 each; CA1 amp., $26; DA2 amp., $15. Byron McCracken, Jr., 502 Allen St., Titusville, Pa.

WANTED — Electronic kits incomplete, out of order, or kits soldered with paste or acid solder that companies refuse to repair. Give details and price. Bigelow Electronics, Box 1, Bluffton, Ohio.

WANT — Home electric welder 25 to 175 amps, single phase. State price, make, and age. J. Waxey, 159 Harrison St., Johnson City, N. Y.

FOR SALE — C2308 chokes, 8 henry, 300 ma., 80 ohms, 3000 v. rms, $6 each; TU7B, $4; cord set of HS-30 headset: CD620E and CD604, $1 each. All items like new and postpaid in U. S. Larry Miller, Jr., 417 Wagner St., Washington, Ill.

WANTED — Used Emerson TV, model 1232 or 1233; RCA KCS 100B 8" picture tube, as is, in repairable condition. Give details and price. W. H. Weiss, 1009 East Riverside Ave., Merrill, Wis.

FOR SALE — Multimeters: Simpson 260, $30; Weston 697 with case and leads, $37.50; Triplett 666, $14.50. All in fine condition and calibration. Will ship anywhere. Lynn Instrument Repair, 2108 Essex St., Berkeley, Calif.

WANTED — Small DC milliamp meter for 1½" mounting hole, 0-1 ma. or less. Harold Denny, 10 Portersville Rd., Washington, Ind.

FOR SALE — Hospital bed radio, coin-operated with pillow speaker, 6 tubes, $25 FOB. M. Shively, 5269 W. Holt Rd., Holt, Mich.

FOR SALE — A-1 military HRO with spkr, power supply and coils, $69.50; Gonset Commander all-band xmitter and VFO, $74.50; Johnson Signal Sentry, $7.95; LW-60 2-meter converter, $7.95; mobile ant., $12.50. Phil Snyder, 133 Pickwick Lane, North Babylon, N. Y.

SELL OR SWAP — Remington elec. shaver, very good cond.; one each 806 and 860 tubes, never used, for cash or swap for ham gear, factory built. L. Seibold, 127 La Salle Ave., Kenmore 17, N. Y.

FOR SALE — Push-pull 1625 AB-1-55 watt modulator; dual power supply 300 v. at 100 ma., 600 v. at 200 ma. Henry Kuck, 186-10 Wexford Terr., Jamaica 32, N. Y.

FOR SALE — Radio parts — resistors, capacitors, transformers, tubes, speakers, knobs, etc. J. Arthur, R. 2, Endicott, N. Y.

SWAP OR SELL — All unused: 800 bathtub capacitors, 600 and 1500 v.; 3000 resistors, 1 and ½ w. Want receivers, photo, navigational, or electrical equip., generators, books. Raymond F. Gegenheimer, 27 Longfellow Dr., Colonia, N. J.

WANTED — Two each Thordarson CHT power xformers, 15R05, and chokes T-74C29, new if possible. State price and cond. Norman M. Wray 3941 No. Bresee Ave., Baldwin Park, Calif.

FOR SALE — Raytheon RAY-34 boat radio, 56 w., 6 v., never used. Bargain. C. N. Vallette, 1026 Claire Ave., Huntingdon Valley, Pa.

SELL OR TRADE — Vols. 1 thru 4 Sams Photofacts, in deluxe binders, like new, $12.50 each, or $45 for the four, postpaid, or trade for U.S. coins. Harold Garrett, 711 South N. Y., Sedalia, Mo.

SELL OR TRADE — 2 meter transmitter, 65 w., neat desk top cabinet, PTT relay and modulator built in, mike. George S. Low, 92 Maple St., Dobbs Ferry, N. Y.

WANTED — Car radio for 1951 Mercury. Quote price and condition. Camille Pichette, Jr., 98 Fourth St., Auburn, Me.

FOR SALE — Garrard RC-80 changer, 3 plug-in heads, base, 45 rpm spindle, GE VR-II cartridge, $40. John A. Kimm, 934 Judson St., Evansville 13, Ind.

FOR SALE — Assembled unused but tested Heathkit QF-1 Q Multiplier at cost, $10. Immediate delivery. Henry Orloff, 565 N. Alexandria Ave., Los Angeles 4, Calif.

FOR SALE — Parts for 2000 v. power supply, $38; V-M 972-A Tri-O-Matic record changer, $35; Bell & Howell 730 Stereotone tape recorder, $225; Eico 666 tube tester and CPA, $67.50. Glenn Saunders, 15529 Center Ave., Harvey, Ill.

SELL OR SWAP — Pyramid analyzer; Weston 984-985 calibrator and sweep gen.; Simpson colorscope, Simpson field strength; Hickok 195B scope; Browning 140 AM-FM tuner. Want SW receiver or woodworking equip. Pyramid Hi-Fi and TV, Edgemont, S. Dak.

FOR SALE — 342-N receiver with speaker, needs repair; TV and FM crystal controlled oscillator; Sola constant voltage transformer. Morris Elias, 41-42 66th St., Woodside 77, N. Y.

WANTED — Student technician to assist part-time in the wiring of Sprayberry chassis to TV tube. Joseph Master, 67-32 150th St., Flushing, N. Y.

FOR SALE — Best quality 165 x 18 oval 100% polyethylene 300-ohm TV lead-in wire at $15.95 per 1,000-ft. spool. L. E. Greenlee, Box 1036, Anderson, Ind.

FOR SALE — Z Match, containing dummy antenna; Jones micro match (10-100-1000 watts); antenna tuner. Cond. and operation very good, $55 FOB. Joseph F. Dineen, 9 Winter Terr., Westwood, Mass.

SELL OR TRADE — 75 fuse, cut out, GE model 9E6A24, 5 Kv., 50 amp; 300 WECO 7A fuse; 200 Cook 5A fuse. Want stereo components. R. Halbert, 609 East Hillsboro, Tyler, Texas.

SELL — Radio and TV books (McGraw-Hill); Merit and Stancor power, output, and filament transformers, and HO car kits, $1.00 each. Jim Babcock, 357 Knoedler Rd., Pittsburgh 36, Pa.

FOR SALE — VFO-matic 8020; 4-400 A tube; HT30 control relay; 10B microphone; Johnston deluxe TR switch; 829B-803 tubes. V. Howerdel, 223 Terrace Ave., Jersey City, N. J.

SELL — Power transformer, 1000 v. each side CT, tapped at 700 v. each side CT, 300 ma. with one 5 v. and two 6 v. windings, tapped primary, shielded. Also similar 10 henry, 250 ma. GE choke. Both very fine, $15. Weiman, 4514 Ave. "K", Brooklyn 34, N. Y.

FOR SALE — Jackson CRO-2 5" scope used less than 1 hour, including three probes, $160. Joe Tucker, 866 East 48th St., Brooklyn 3, N. Y.

SELL — Dumont 208 scope; Precision E-200, signal gen., and 920 VOM and tube checker; 200 w. VFO transmitter; Webcor tape recorder; Contax single lens reflex camera; VTVM. Send for details. T. F. Waters, 140 West Gilpin Ave., Norfolk 3, Va.

FOR SALE — Eico: 460K scope, $85; 315K r.f. sig. gen., $40; 625K tube tester, $35; 232K VTVM, $30; 249K deluxe VTVM, $40. RCP flyback capacitor tester, $30. Alvin J. Cottrell, Box 32, Saunemin, Ill.

FOR SALE — Heath 6-12 v. battery elim., BE-4 with manual, very fine condition, $25 postpaid. R. H. Rogers, 28 Bellamy St., Brighton 35, Mass.

WANT — Monoscope or B&K dyna-scan (scanner), reasonable. RAM Television Service, San Vicente 4, Mayaguez, P. R.

FOR SALE — Heath A-7E amplifier, exceptionally good, $17. Local. Robert Price, 2337 Walton Ave., Bronx 68, N. Y.

FOR SALE — Hallicrafters S-85 comm. type receiver, very good cond., $100. Local only. Bernard Krinsky, 1314 Ocean Parkway, Brooklyn 30, N. Y.

WANTED — Records and transcriptions, prewar. Sell Triplett 3441 unused scope. James Orlando, Dickerson Run, Pa.

FOR SALE — Altec 820C speaker system, includes corner enclosure, 802B HF spkr, H808 HF multicellular horn, N800D dividing network, 2 803A LF 15" spkrs., $200. Local only. M. Ross, 7354 Tulane Ave., University City 30, Mo.

FOR SALE — Unused DSB-100 transmitter, factory wired, $95; record player, $10. H. J. Hoffman, 366 Canterbury Road, Bay Village, Ohio.

SELL OR TRADE — Amphenol UHF corner type anntenna, reasonable. V. C. Gladney, 236 Longhill Dr., Short Hills, N. J.

FOR SALE — Two-meter station includes 30 w. xmitter and 10-tube receiver, with tubes, power supplies, speaker, mike, antennas, VFO, coax, relay rack, antenna relay, crystals, and schematics. Best offer over $100. Richard Zucker, 171 Halsey St., Paramus, N. J.

FOR SALE — 8 self-servicing tube testers made by General Electronics Research Co., like new, sell for $75 each. Bill and Ed's TV, 1717 22nd St., No. Chicago, Ill.

WANTED — For repair parts, Hickok 288X or 277X signal generator. Give cond. and price. Steves Radio Service, Wickes, Ark.

FOR SALE — Mobile transmitter, with dynamotor, cables, and all controls for 20 and 10 meters. Best offer. M. Schwartz, 166-36 24th Rd., Flushing 57, L. I., N. Y.

FOR SALE — Astatic JT-30 crystal mike, 10' cable and desk stand, $7.50; Philco 7050 tube tester, $20; low pass filter LT-40 40 Mc. microphase 50 w., $20. Wm. D. Gilley, 4316 McMillen Pr. Dr., Fort Wayne, Ind.

FOR SALE — Mallory TV-101 UHF converter, and Regency RC-600 UHF converter. Both very good condition, each $10.50 postpaid. J. A. d'Hemecourt, 3221 De Soto St., New Orleans 23, La.

FOR SALE — RCA WT-110A automatic tube tester, all accessories, 15 months old, guaranteed. Best offer over $125. Also have ICS Radio and TV correspondence course, no kits, $60 FOB. C. T. Davis, Morrisville, N. Y.

WANTED — For cash: Tape deck or tape recorder, working or not, such as Viking. W. A. Banton, 504 Higuera St., San Luis Obispo, Calif.

FOR SALE — RCA Review back issues. Fort Neck Television, 526 Broadway, Massapequa, N. Y.

SELL OR TRADE — Antique spark receivers and other radio gear dated 1917. Write for list. William E. Barrett, 2828 South Ninth St., Sheboygan, Wis.

TRADE — 8 wt. PA amplifier, for 3" scope, audio gen., 35 mm camera, 8 mm camera, or projector. Wayne Schmidt, Buckley, Ill.

FOR SALE — Riders radio manuals Vols. 6 through 21, good to new condition. Best reasonable offer, or swap for good 35 mm camera. O. R. Gano, 1104 Seagle Bldg., Gainesville, Fla.

FOR SALE — Riders TV manuals 4 - 5 - 12 - 15 to 20, $100; McMurdo-Silver 909 sweep gen., $25; Eico VTVM, $20; in-circuit capacitor tester, $10; Eico HF 20 amp., $45; 100 amp. portable battery fast charger, $30. Control TV, 123 Avenue "U", Brooklyn 23, N. Y.

WANTED — R-42 speaker in good cond. State price. W. G. Jackson, 410 Herzberg Circle, East Gadsden, Ala.

WANTED — Older tube checkers, VOM's, and VTVM's bought, any condition. Send model number, approx. age, and general condition for cash offer, or state price wanted. P. J. Vogel, 3328 Caroline St., St. Louis 4, Mo.

FOR SALE — Heathkit SG-8 RF signal gen., four months old, very good cond., with manual, $20. Daniel Seidler, 2644 W. 23rd St., Chicago 8, Ill.

WANTED — Hewlett-Packard, Gen. Radio, L&N, Collins, military test equip., manuals, lab. instruments. Charles Littell, Jr., Farhills Box 26, Dayton 19, Ohio.

FOR SALE — Hallicrafter SX-25, complete with speaker and manual, good cond. Best offer. John Perkovich, R. 1, Box 115, Waldo, Wis.

FOR SALE — Ampex BC-450 institutional tape mechanism, 3¾ ips background music speed, good condition, with pre-amp, reversing chassis, and take-up reel, $350; extra heads, $75. Audio Masters, Inc., 119 Holmes Ave., N.W., Huntsville, Ala.

NEED CASH — HQ-129-X with National 10" speaker, very good cond.; Lettine 240 transmitter, antenna tuner, all coils, mike, key, lo-pass, cables, relay box. No reasonable offer refused. Dubov, 3100 Brighton 2nd St., Brooklyn 35, N. Y.

FOR SALE — RCA color TV Picto-Guide, $3; 2-pwr xfmrs from 630 chassis, $2 each; Master mobile ant. mount 232XSSC, $8; VC50-32 and 12, $5 each FOB. S. Egelberg, 3029 Matthews Ave., Bronx 67, N. Y.

FOR SALE — Gonset 6 meter converter, 12/6 v., $25; Gonset Super Six, 12 v. fils, $30; 4X150A, $5; 4-65A, $10; 2C39A, $7. All unused; RME VHF-152A, needs work, $15. B. Weisberg, 2707 Creston Ave., Bronx 68, N. Y.

NOVICES — Complete ham station: Heath DX-20 xmtr., novice xtal, $34; Hallicrafters S-38D rcvr., $35; Heath balun coils, $6.95. Whole station only $68.50. H. Spieler, Bowmansville, Pa.

FOR SALE — 33 early issues of Popular Electronics; Heath 0-6 scope; Eico 360 sweep gen.; 145 signal gen.; Superior channel analyzer; Rider and Supreme manuals. Best offer. L. Spindler, Box 312, Morris, N. Y.

WANTED — 12" coax. speaker, Bozak or University preferred. Thomas Burgess, 66 Fern St., New Bedford, Mass.

Consistently Dependable
Cornell-Dubilier
miniaturized capacitors

The smaller the capacitor the more you will appreciate C-D's built-in extras!

Cornell-Dubilier has proved that you don't have to compromise with quality for size in a capacitor. You will find that regardless of how small a C-D capacitor may be, it still retains that extra margin of safety required in a high quality miniaturized unit. *See your classified telephone directory for nearest C-D jobber.*

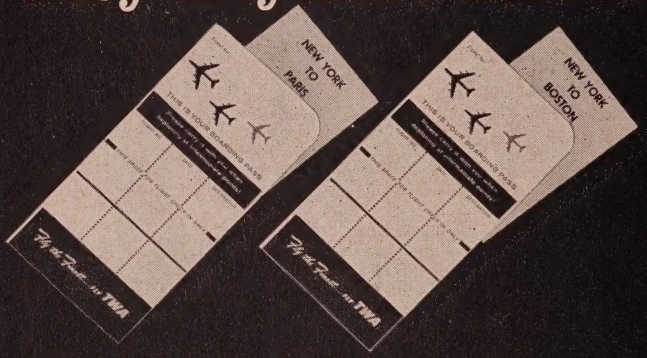
IF IT CAN BE MADE SMALLER . . . C-D DOES IT!

THERE ARE MORE C-D CAPACITORS IN USE TODAY THAN ANY OTHER MAKE

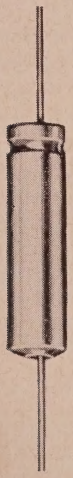
CORNELL DUBILIER *Capacitors*

PLANTS IN SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASS.; PROVIDENCE AND HOPE VALLEY, R. I. INDIANAPOLIS, IND.; FUQUAY SPRINGS AND SANFORD, N. C.; AND SUBSIDIARY, THE RADIART CORPORATION, CLEVELAND, OHIO

They May Look Alike...



But what a difference!



It's the same with capacitors. Others may look like C-D miniaturized electrolytics, but only C-D's have the built-in extras that are the result of 50 years of capacitor leadership. Next time you buy capacitors, insist on performance. Insist on C-D... *by name!*

TYPE NLW (ELECTOMITE)

Hermetically sealed into an *ultra-small* aluminum can, this aluminum foil tubular has *welded* terminal connections to insure long-lasting performance. It is ideal for transistorized and printed circuits.

insist on them by name

CORNELL-DUBILIER CAPACITORS

Printed in U.S.A.